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Robertson et al.

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[54] **AIR CONTROL VALVE**

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[22] Filed: **Sep. 4, 1984**

[51] **Int. Cl.**[4] **E04H 3/18**

[52] **U.S. Cl.** **4/492**; 4/541; 4/542; 4/488; 128/66; 137/614.2; 251/310; 251/351; 251/352

[58] **Field of Search** 4/492, 541, 542, 426, 4/488; 251/349, 351, 352, 310, 312; 137/614.2; 128/66

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Primary Examiner—Henry K. Artis

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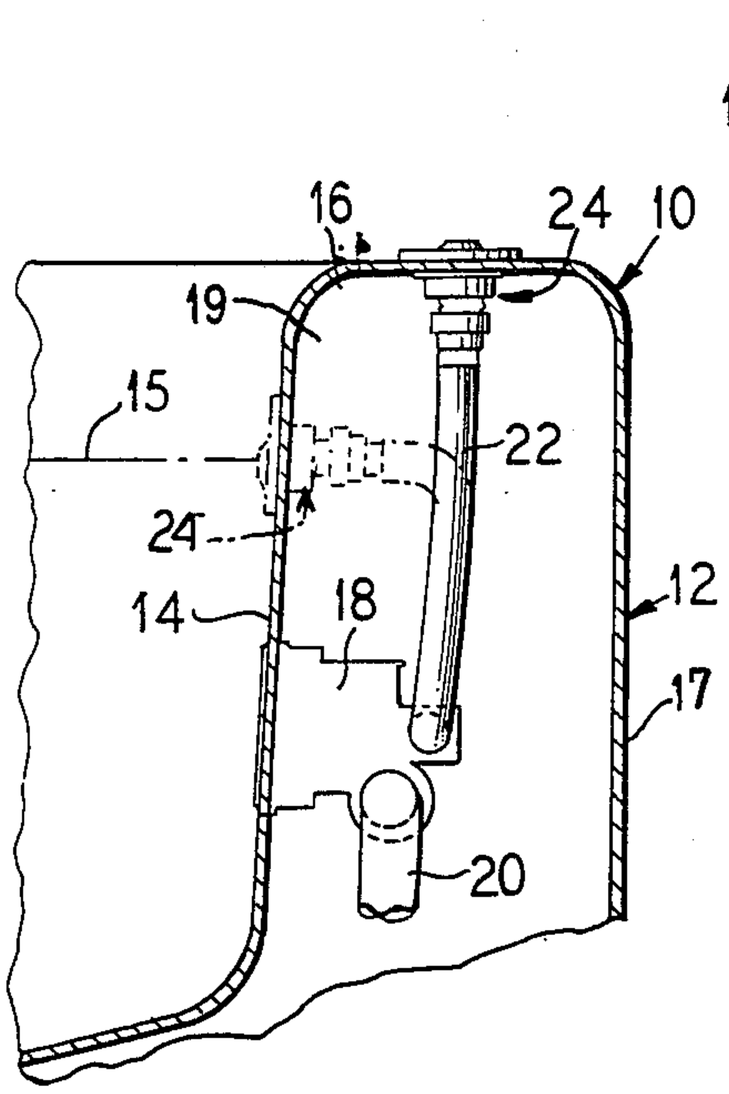
[57] **ABSTRACT**

An air control valve is provided for use in a spa to regulate the flow of air to a hydrotherapy jet in which a recessed control knob is accessible at a rim of the spa to actuate a movable valve member to selectively constrict or dilate an air flow passage through the valve body which has an air intake opening underneath the spa rim to isolate the noise associated with the intake opening from the user.

11 Claims, 6 Drawing Figures



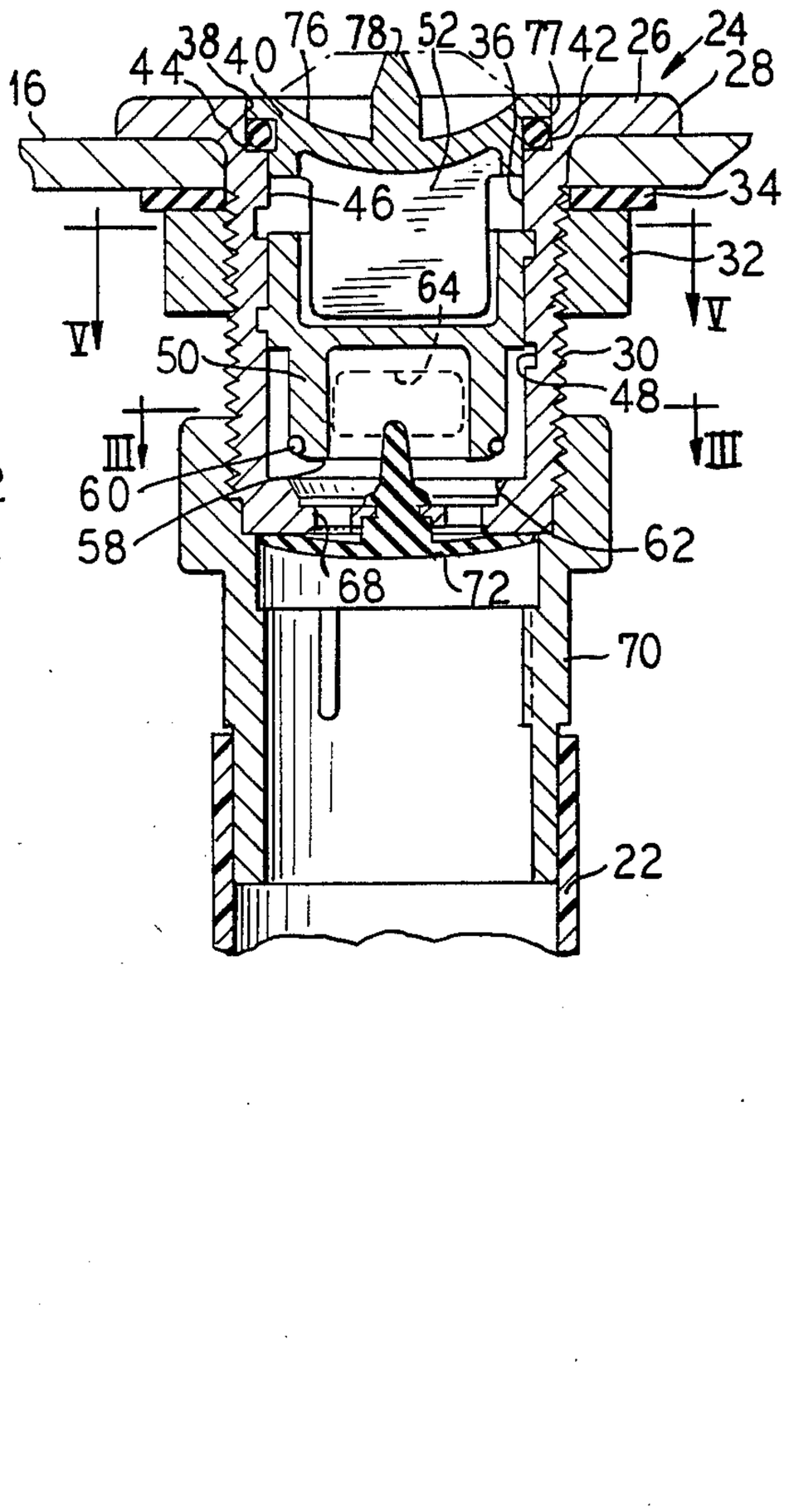
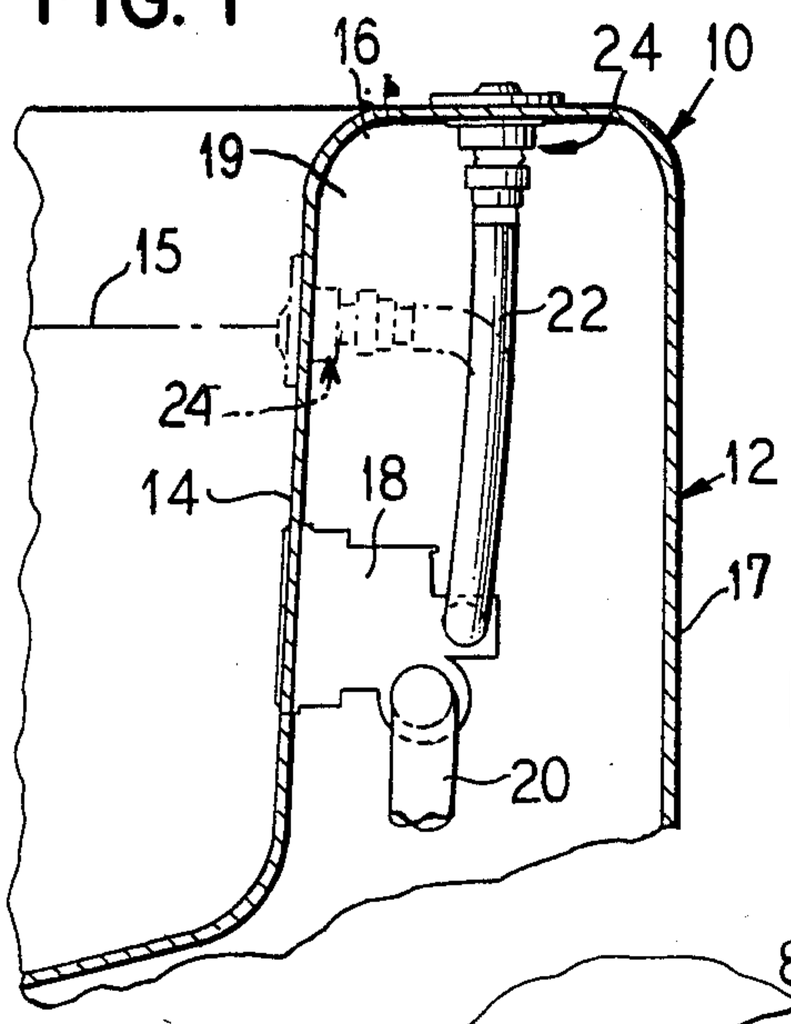


FIG. 1



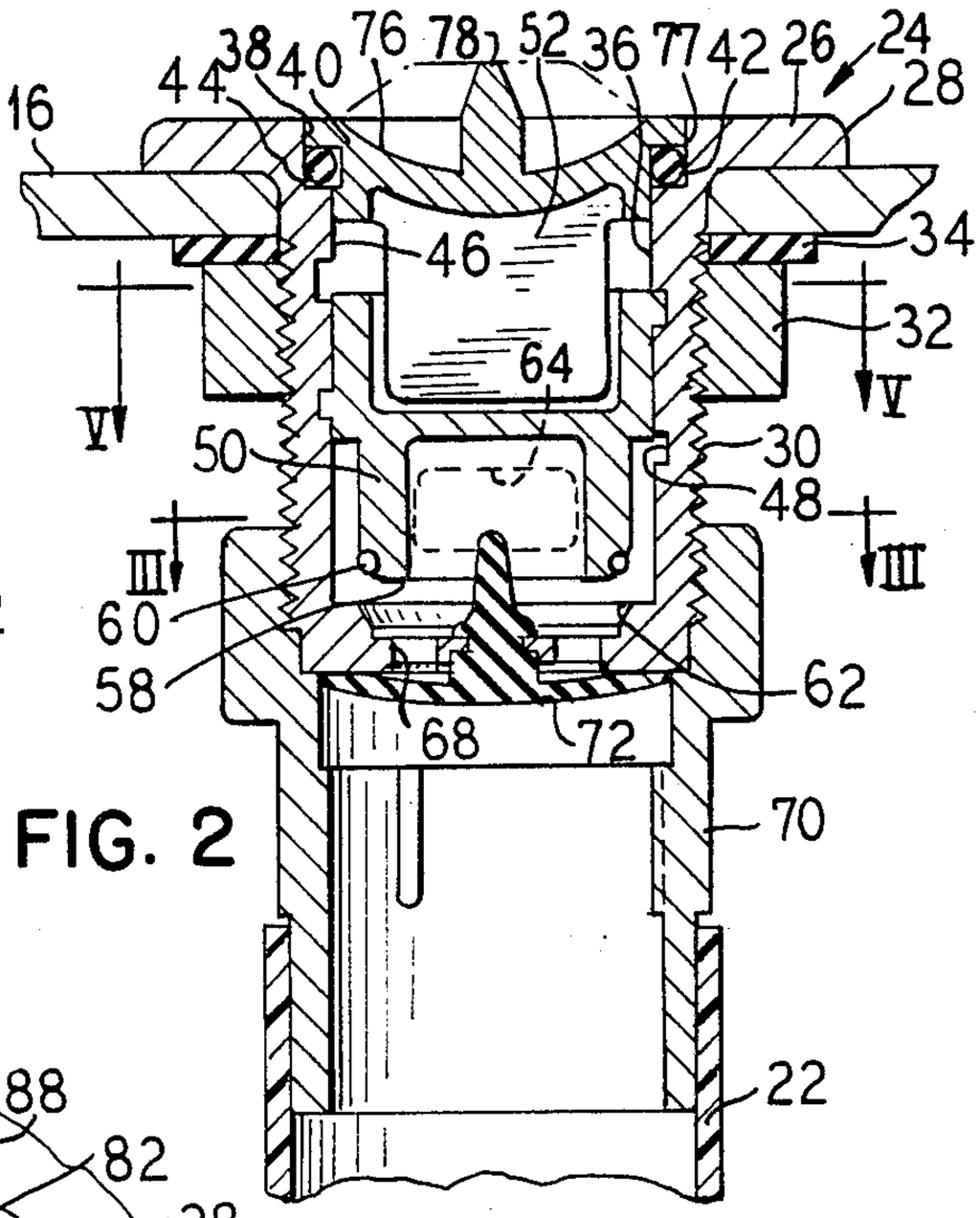


FIG. 2

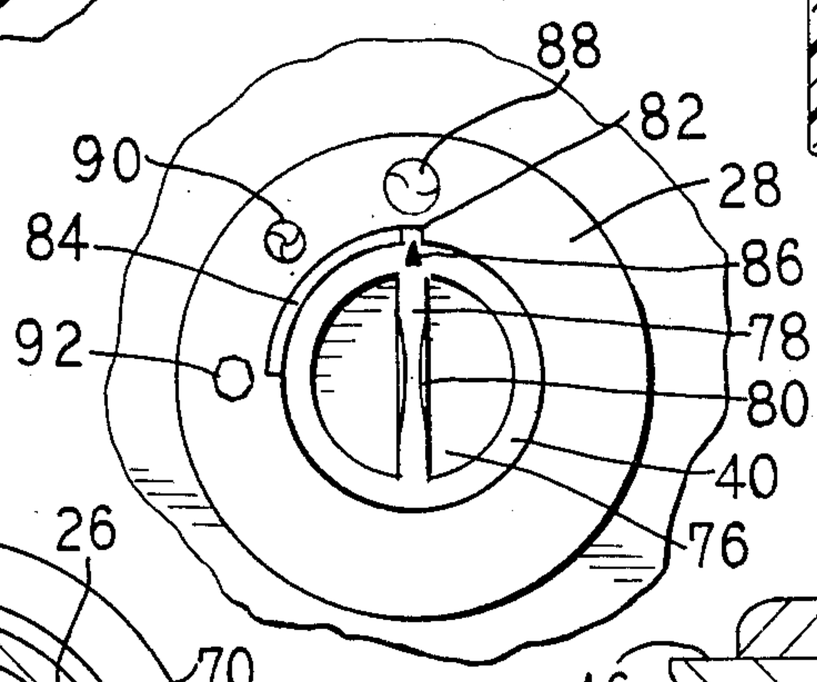


FIG. 4

FIG. 3

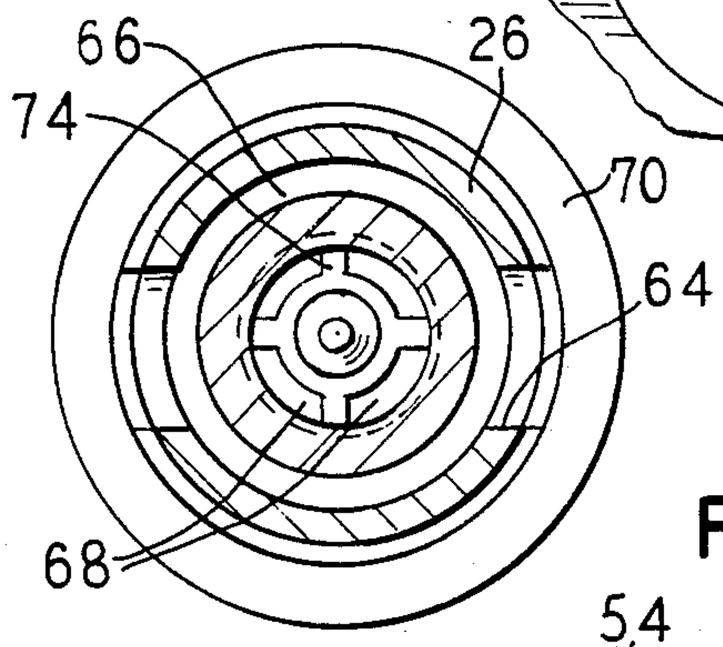


FIG. 5

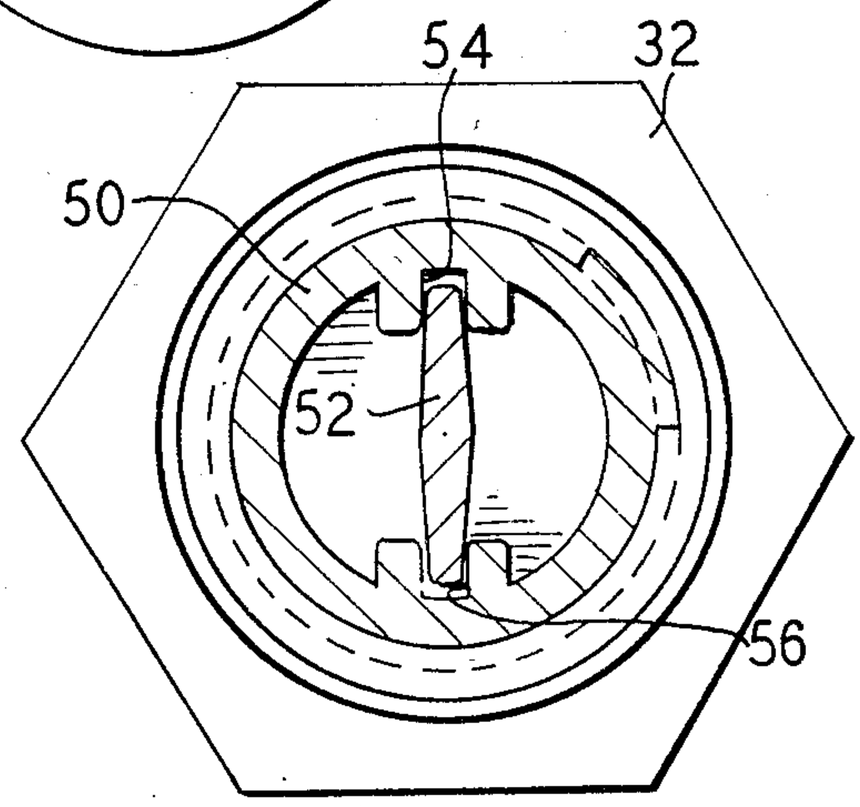
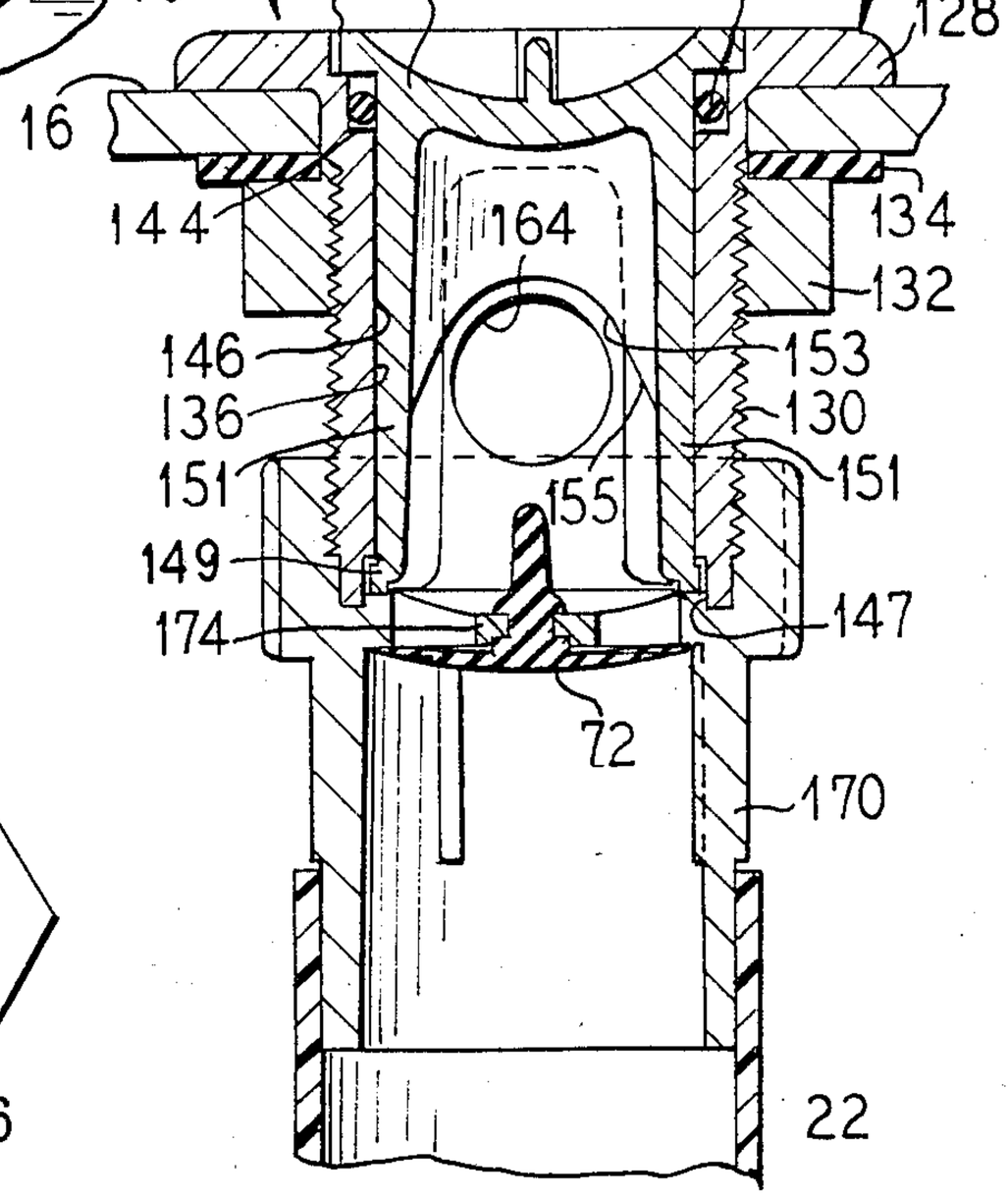


FIG. 6



AIR CONTROL VALVE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an air control valve and more specifically to a control valve for use in an air line connected to a hydrotherapy jet.

2. Description of the Prior Art

Air control valves used to supply air for hydrotherapy jets are commonly used in spas and whirlpools and are usually positioned on the top lip or rim of the spa shell and obtain intake air for the jet in close proximity to the spa user's ear. The air rushing in through the valve can create an undesirable level of noise in an otherwise relaxing atmosphere. Also, items may be tossed or placed on top of the valve, such as towels, balloons or toys, which tend to block off the air flow. Additionally, the air intake can also be filled with water from inside the spa due to overfilling or splashing, thereby rendering the jet less effective with no aspiration.

Many currently available air control valves provide air adjustment using a threaded valve barrel, thus not providing the user with any visible indication of the degree to which the valve is opened.

U.S. Pat. No. 3,874,374 discloses an air control valve in which a housing is secured below the rim of a hydromassage tub which includes a valve assembly regulated by control levels accessible on the rim. Air enters the housing past a check valve and then passes through ports in air caps which are selectively alignable with ports in air tubes to continue into air conduits to hydromassage jets. The air caps are rotatable by rotating the control knobs which project above the level of the rim.

SUMMARY OF THE INVENTION

The present invention provides an air control valve which obtains the intake air from beneath the top lip of the spa shell, but with a control knob accessible from the top lip or from the interior of the spa shell. This is done through a rotor inside a flange of a valve body with matching ports in the valve body underneath the lip. Alternatively, it may be done through a threaded rotating barrel axially movable independent from the control knob to vary the air flow passage through the valve. This provides a barrier of acrylic and fiberglass between the air intake and the user's ear which reduces the noise below that of other surrounding noises. A seal is provided at the top of the rotor and flange to prevent water from entering the valve from the spa. Also, a check valve is included in the valve assembly to prevent water from backing up through the valve assembly if the outlet openings of the hydrotherapy jets are plugged.

The control knob used with the valve embodying the principles of the present invention is rotatable through 90° between a fully closed position and a fully opened position and indicia markings are provided adjacent to the control knob to indicate to the user the degree to which the valve is opened.

The control knob is mounted in a flange of the valve body on the rim and has a recessed profile thereby providing a less obtrusive mechanism on the spa rim. No additional housing is required for the valve body which is held against the rim by a single jam nut thereby

resulting in a compact and inexpensive control valve assembly which is easy to assemble.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevational view of the valve assembly attached to a hydrotherapy jet taken through a section of a hydrotherapy spa.

FIG. **2** is a side cross sectional view of the valve assembly.

FIG. **3** is a sectional view taken generally along the lines III—III of FIG. **2**.

FIG. **4** is a plan view of the control knob portion of the valve assembly.

FIG. **5** is a sectional view taken generally along the lines V—V of FIG. **2**.

FIG. **6** is a side section view of an alternative embodiment of a valve assembly embodying the principles of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Although the control valve embodying the principles of the present invention can be used to control the flow of any fluid through the valve body where it is desirable to have the fluid intake remote and isolated from the control knob, by way of example and illustration, the invention is shown in an environment of a hydrotherapy spa and is used to control the flow of air to the hydrotherapy jets.

In FIG. **1** there is a partial showing of a hydrotherapy spa generally at **10** with a shell **12** forming an inner wall **14** to hold a quantity of water **15** and a top rim **16** extending around the circumference of the shell which is connected to an outer wall **17**. Mounted through the inner wall **14** are a plurality of hydrotherapy jets **18** (only one shown) which project into a space **19** between the shell walls **14, 17** and are provided with a supply of water under pressure through conduits **20** forced through a nozzle causing an aspiration of air through an air inlet conduit **22** connected to atmosphere through a valve assembly **24**.

The valve assembly **24** is shown in full lines as being mounted on the spa rim **16**, however, since the valve draws air from the space **19** within the shell, the valve may also be mounted on the inner wall **14** above or below the water line **15**. As described below, the valve assembly is mounted in a water tight manner to the spa wall and therefore its placement position on the spa shell is unlimited.

The valve assembly **24**, which embodies the principles of the present invention, is shown in greater detail in FIGS. **2–6**. In FIG. **2** the side cross sectional view of the valve assembly **24** is shown where it is seen that there is a valve body **26** which extends through an opening in the rim **16** and has an enlarged flange area **28** which overlies a portion of the top of the rim **16** and exhibits a low profile above the rim. The remainder of the body **26** extends downwardly into the open area **19** within the shell, between the inner **14** and outer **17** walls, and comprises a cylindrical threaded portion **30**. The valve body **26** is secured against the rim wall **16** by means of a jam nut **32** which engages the threaded cylindrical portion **30** and is advanced against a seal member **34** such as a gasket to provide a water-tight connection for the valve body **26** to the rim **16** or elsewhere on the spa shell.

The valve body **26** has a central passage **36** therethrough for receiving various components of the valve

assembly. At the flange end of the valve body, the passage **36** has an enlarged circumference **38** to receive a control knob **40** which is selectively rotatable within the passage. An O-ring seal member **42** is provided between the control knob **40** and the enlarged passage area **38** and is seated on a shoulder **44** forming the top end of a main portion **46** of the internal passage **36**.

The main portion **46** of the passage **36** has an internal thread **48** therein for receiving an externally threaded movable valve member **50**. As seen in FIGS. **2** and **5**, the control knob **40** has a downwardly extending tongue **52** which is engaged in opposing slots **54, 56** in the movable valve member **50**. In this manner, rotation of the control knob **40** will drivingly rotate the valve member **50**. Rotation of the valve member **50** will result in an axial movement of the valve member relative to the valve body **26** and control knob **40**.

The valve member **50** has at its lower end **58** an O-ring seal member **60** to engage in a valve seat portion **62** in the central passage **36** in the valve body **26**. The valve body **26** has a pair of opposed openings **64** through the threaded cylindrical portion **30**, as best seen in FIG. **3**, to permit air to be drawn from the space **19** within the spa shell **12** into the valve assembly **24** to pass into the air conduit **22**. As the air enters through openings **64**, it passes through an annular space **66** between the main portion **46** of the valve body central passage **36** and the valve member **50**, beneath the bottom end **58** of the movable valve member **50** and through openings **68** in the bottom of the valve body **26**.

An adaptor member **70** is threadingly received on an end of the valve body **26** to which the air conduit **22** is connected. To prevent water from backing up into the valve body and discharging through openings **64** into the space within the spa shell **12** when the hydrotherapy jet **18** is blocked, a flexible check valve **72** is held in a spider **74** just below the openings **68** in the bottom of the valve body **26**. As air is drawn into the conduit **22**, the flexible umbrella portion of the check valve **72** moves away from the bottom wall of the valve body **26** to allow passage of air. If there is a back flow of air or water through openings **68**, the umbrella portion will seal against the bottom wall of the valve body **26** preventing further upward movement of water or air through the valve assembly.

The control knob **40** has a recessed top surface **76** received in the valve body **26** such that an outer circumference **77** of the knob **40** is flush with the top surface of the flange portion **28** and the central portion of the top surface **76** is recessed below the top surface of the flange area **28** to provide an unobtrusive profile to the control valve assembly. An elevated diametrical wall **78** extends across the top surface **76** of the knob **40**, which has a low profile above the top surface of the flange area **28** and has a serrated external surface **80** to provide a knurled gripping surface to assist a user in grasping and rotating the knob **40**. The knob also has a projection **82** at one point on the outer circumference of the knob near the top surface which is received in an arcuate slot **84** in the flanged portion **28** of the valve body **26**. The arcuate slot **84** extends through 90° and the end walls of the slot act as stops to prevent further rotation of the knob **40**.

Indicia markings are provided on the flange **28** along the length of the slot **84** to indicate to the user the condition of the valve. A small pointer **86** is provided on the projection **82** which can be aligned adjacent to any of the indicia markings. A first marking **88** represents an open valve, a second marking **90** represents a partially closed valve and a third marking **92** is in the shape of an octagon representing a closed valve. When the pointer is rotated to be adjacent to the closed valve indicia marking **92**, the movable valve member **50** will be moved downwardly constricting the air flow passage until the O-ring **60** is seated in the valve seat **62** thereby preventing passage of air through the valve assembly. In this position, the hydrotherapy jet **18** will eject only water under pressure and no air. As the control knob **40** is rotated, moving the pointer **86** toward the open valve symbol **88**, the movable valve member **50** will be lifted away from the valve seat **62**, dilating the air flow passage, thereby allowing greater amounts of air to pass through the valve body and out through the hydrotherapy jet **18**.

In FIG. **6** there is shown an alternate embodiment of a valve assembly **124** which includes a valve body **126** having a flanged portion **128** overlying the spa rim **16**. The valve body **126** extends through an opening in the spa rim **16** and has a cylindrical threaded portion **130**. A jam nut **132** engages the threaded cylindrical portion **130** and is used to tighten the valve body **126** sandwiching a gasket **134** between the nut **132** and the spa rim **16** as described above.

A central passage **136** extends through the valve body **126** and has an enlarged area **138** to receive the circumference of a control knob **140**. An O-ring seal member **142** is provided between the valve body **126** and the control knob **140** which rests on a step **144** forming the top end of a main portion **146** of the passage **136**. The passage **136** has an enlarged bottom end **147** for receiving an enlarged circumferential retaining portion **149** of the control knob **140**.

The valve body **126** has a pair of opposed openings **164** through the threaded cylindrical portion **130**. The control knob **140** has a pair of opposed legs or lands **151** which extend below the level of the openings **164**. The legs **151** are connected by a cylindrical wall **153** which has a pair of opposed arcuate relieved portions **155** which at their highest point are above the level of the openings **164** such that as the control knob **140** is rotated about its axis, the relieved areas **155** are moved in and out of registration with the openings **164** to present an effective opening having a maximum dilated size of the opening **164** which can be reduced or constricted to no opening. Thus, a 90° rotation of the control knob **140** provides the range of full open to closed.

An adaptor member **170** is threaded onto the cylindrical threaded portion **170** of valve body **126** and is sized to receive the air conduit **22**. The flexible umbrella type check valve member **72** is received in a spider **174** formed in the adaptor **170**.

The operation of this alternative valve assembly is virtually identical to that described above in that air is drawn into the valve assembly from the underside of the spa rim thereby isolating the noise associated with the valve, and the control knob may be rotated through 90° providing a range of a full on to a full off position for the air intake.

Thus, it is seen that the present invention provides for an air control valve used to supply air for hydrotherapy jets which considerably reduces the noise associated with the valve and also reduces the poseibility of blocking the air flow to the valve by placement of articles on the spa rim. The user is provided with a visible indication of the degree of constriction of the valve, and back-

flow of water from a blocked hydrotherapy jet is prevented.

As is apparent from the foregoing specification, the invention is susceptible of being embodied with various alterations and modifications which may differ particularly from those that have been described in the preceeding specification and description. It should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of our contribution of the art.

We claim as our invention:

1. A fluid control valve assembly comprising:

a valve body adapted to be mounted through a wall,

said valve body having a cylindrical bore therethrough and at least one opening through a side wall thereof to communicate with said bore thereby forming a fluid passage,

a movable valve member carried in said bore and actuated by a control knob engaged in said valve body, said valve member movable in said fluid passage to selectively constrict or dilate said passage,

said control knob accessible on a side of said mounting wall opposite the location of said valve body opening,

said control knob and said valve member being rotatably movable relative to said valve body, and said valve member being axially movable relative to said control knob and said valve body,

said control knob having an axially extending tongue portion received in slots in said movable valve member to permit said valve member to move axially relative to said control knob while still being rotatably actuated by said knob,

a check valve member positioned between said movable valve member and said air conduit to prevent back flow of water through said valve assembly,

whereby fluid enters said valve body remote and isolated by said mounting wall from said control knob.

2. The device of claim **1** wherein said valve body mounts through said wall by having an upper flange resting on a top surface of said wall and fastening means engaged below said wall, said control knob being recessed in said flange to present a low profile of said control valve assembly above said wall.

3. For use in a hydrotherapy spa having an inner and outer wall with a connecting rim and a hydrotherapy jet mounted in said inner wall which aspirates air through an air conduit, an air control valve assembly comprising:

a hollow valve body having a flange portion seated above said rim and a cylindrical portion extending below said rim and between said walls,

said valve body having at least one opening through said cylindrical portion forming an air passage through said valve body,

a movable valve member carried in said valve body and actuated by a control knob to selectively change said air passage size between a minimum and maximum size,

said control knob and said valve member being rotatably movable relative to said valve body, and said valve member being axially movable relative to said control knob and said valve body,

said control knob having an axially extending tongue portion received in slots in said movable valve member to permit said valve member to move axially relative to said control knob while still being rotatably actuated by said knob,

a connection means between said valve body and said air conduit, and

a check valve member positioned between said movable valve member and said air conduit to prevent backflow of water through said valve assembly.

4. The device of claim **3** wherein said control knob is accessible at said rim.

5. The device of claim **4** wherein said control knob is rotatable through an angle of 90° to actuate said movable valve member.

6. The device of claim **5** including indicia markings adjacent to said control knob to provide a visual indication of the position of said movable valve member.

7. The device of claim **3** wherein said check valve member comprises an umbrella-type flexible valve member mounted in a spider at a bottom end of said valve body.

8. The device of claim **3** wherein said check valve member comprises an umbrella-type flexible valve member mounted in a spider in said connection means between said valve body and said conduit.

9. The device of claim **3** wherein said movable valve member is threadingly received in said valve body such that rotation of said movable member causes axial movement of said movable member.

10. The device of claim **3** wherein downward axial movement of said movable member causes a lower end of said movable member to seat in a valve seat in said valve body to completely seal said air passage through said body.

11. For use in a hydrotherapy spa having an inner and outer wall with a connecting rim and a hydrotherapy jet mounted in said inner wall which aspirates air through an air conduit,

an air control valve assembly comprising:

a hollow valve body having a flange portion seated above said rim and a cylindrical portion extending below said rim and between said walls and being connected to said air conduit,

said valve body being secured to said rim and having at least one opening through said cylindrical portion forming an air passage through said valve body to said air conduit,

a movable valve member carried in said valve body and actuated by a control knob to selectively constrict or dilate said air passage,

said control knob rotatably mounted in said flange portion of said valve body and being accessible above said rim,

said control knob being distinct from said movable valve member such that rotary movement of said control knob is translated into axial movement of said movable member through a threaded connection between said movable member and said valve body, and

a check valve member positioned between said valve body opening and said air conduit to prevent reverse flow through said air passage,

whereby, rotation of said control knob regulates the flow of air through said air conduit.

* * * * *